



TECHNICAL UNIVERISTY OF MOMBASA

Faculty of Engineering & Technology

DEPARTMENT OF COMPUTER SCIENCE & INFORMATION TECHNOLOGY

UNIVERSITY EXAMINATION FOR:
BACHELOR OF SCIENCE/TECHNOLOGY IN INFORMATION
TECHNOLOGY
(BSITM12/BTIT J13)

EIT 4214/ICS 2311: COMPUTER GRAPHICS

END OF SEMESTER EXAMINATION

SERIES: AUGUST 2013

TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*

This paper consists of **FIVE** questions. Attempt question **ONE** and any other **TWO** questions

Maximum marks for each part of a question are as shown

This paper consists of **THREE** printed pages

Question One (Compulsory)

- a) Define the term “Computer Graphics” (2 marks)
- b) Outline the role played by Open GL in computer graphics (3 marks)
- c) Explain the following Open GL terms (3 marks)
- (i) FLTK
 - (ii) GLUT
 - (iii) BOOST
- d) Describe using a diagram, the construction and operation of a coloured CRT monitor (5 marks)
- e) (i) Define the term polygon clipping. (2 marks)
- (ii) Write a when-sutherland clipping algorithm a line within a viewpoint (5 marks)

- f) Give **TWO** characteristics of each of the following display devices:
- (i) Plasma
 - (ii) LCD's
 - (iii) LED's
- g) Define the following terms:
- (i) Pixel
 - (ii) Vector graphic
 - (iii) Raster image
 - (iv) Virtual reality environment **(5 marks)**
- h) List **FOUR** applications of computer graphics in industry **(4 marks)**

Question Two

- a) Explain the Open GL rendering pipeline using diagram **(4 marks)**
- b) State **FOUR** types of Open GL 3D primitives **(2 marks)**
- c) Illustrate the following computer graphics objects:
- (i) Bezier
 - (ii) Bezieregon
 - (iii) Polygon
 - (iv) Wireframe **(8 marks)**

Question Three

- a) Identify **THREE** standard computer graphics formats that are synonymous with the World Wide Web. **(3 marks)**
- b) Distinguish between RGB color model and the CMVK model clearly stating where each may be used. **(5 marks)**
- c) Differentiate with diagrams the following types of camera views:
- (i) One point perspective
 - (ii) Two point perspective
 - (iii) Isometric view **(6 marks)**

Question Four

- a) Define the following terms:
- (i) Euclidean space
 - (ii) Parametric surface
 - (iii) Computer aided design **(6 marks)**
- b) Outline **FOUR** advantages of using CAD program over manual drawing. **(4 marks)**
- c) Describe the following computer graphics transformation techniques. **(5 marks)**
- (i) Translation
 - (ii) Rotation
 - (iii) Scaling
 - (iv) Reflection
 - (v) Shear **(5 marks)**

- d) Describe with a diagram the construction and operation of a cathode ray tube. **(5 marks)**

Question Five

Rendering is the process of generating an image from a model (or models in what collectively could be called scene file) by means of computer programs. As scene file contains objects in a strictly defined language or data structure, it would contain geometry, viewpoint texture, lighting and shading information as a description of the virtual scene.

The data contained in the scene file is then passed to a rendering program to be processed and output to digital image or raster graphics image file the term “rendering” may be by analogy with an “artist’s rendering” of a scene. Though the technical details of rendering methods vary, the general challenges to overcome in producing a 2D image a 3D representation stored in scene file are outlined as the graphics pipeline along rendering device such as GPU.

Many rendering algorithms have been researched, and software used for rendering may employ a number of different techniques to obtain final image. The main ones include rasterization scanline rendering, ray tracing and radiosity.

- a) Explain the following terms:

- (i) Texture mapping
- (ii) Bump mapping
- (iii) Refraction
- (iv) Motion
- (v) Diffraction
- (vi) Photo realistic

(12 marks)

- b) Outline the following rendering techniques:

- (i) Rasterization
- (ii) Scanline rendering
- (iii) Ray tracing
- (iv) Radiosity

(8 marks)